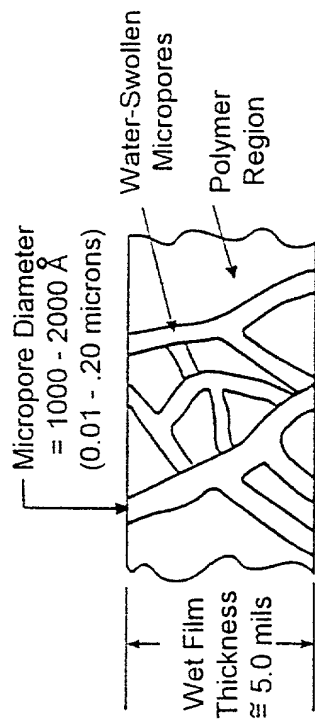
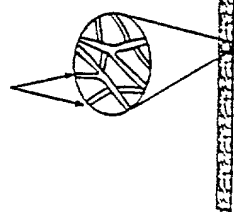


The Gas Permeability and Ionic Conductivity Properties of the Microcomposite Membrane will be Adjusted by Controlling the Concentration of Infiltrated Ion-Conducting Polymer and its Degree of Sulfonation



A. Water-Swollen Microporous Membrane

Micropore Diameter
= $1 - 5 \text{ Å}$ (10^{-4} microns)



1. Drying
2. Heat-Treatment
3. Film Shrinkage through the Thickness

Membrane Dry Thickness
≈ 0.5 mil at 0% Ion-Conductor

B. Dried, Heat-Treated, Substrate Membrane

Ion-Conducting
Polymer Regions Interpenetrating
Polymer Regions

Dry Film Thickness
≈ 1 mil at 10%
Ion-Conducting Polymer
Solution Concentration

Micropore Diameter
≈ $50 - 1000 \text{ Å}$
(0.05 - 0.5 microns)

1. Solvent-Exchange
2. Ion-Conductor Infiltration
3. Drying, Heat-Treatment

Micropore Diameter and
Dry Film Thickness
will Decrease with Decreasing
Infiltrant Concentration

Substrate Polymer Regions

C. Dried, Heat-Treated
Microcomposite Membrane Containing
~ 50 Volume Percent
Ion-Conducting Polymer

FIG. 1

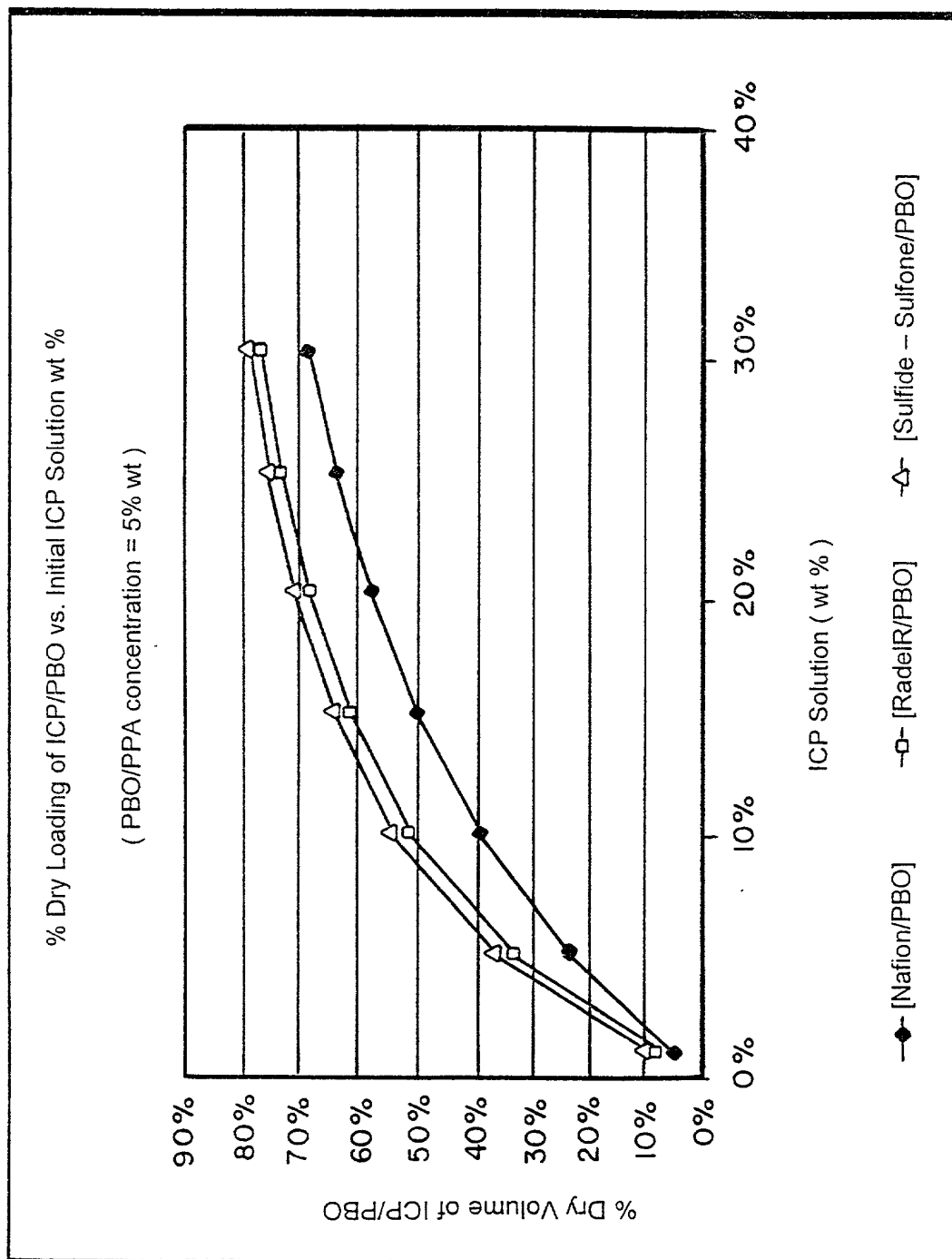


FIG. 2